

**REMARKS**

The Final Office Action ("Final Office Action") mailed May 22, 2003, and the Advisory Action ("Advisory Action") mailed December 16, 2003, have been received and reviewed. In the Advisory Action, the Examiner states that claims 16-23, 25, and 28-30 stand rejected and that no claims are allowed. However, Applicants respectfully submit that claims 16-23, 25, and 27-30 are pending in the application and, therefore, proceed under the assumption that claims 16-23, 25, and 27-30 stand rejected. Applicants propose to amend claims 16, 17, 19, 25 and 27-30, and respectfully request reconsideration of the application as amended herein. With the exception of the amendments to claim 30, all of the amendments merely replaced the term "said" with "the," an equivalent term. None of the amendments, including those to claim 30, reduce the scope of the claims.

Applicants note that a Request for Continued Examination including a Request for Suspension of Action were filed on January 16, 2004. Applicants hereby request termination of the suspension of action and consideration of the following amendments and remarks in response to the Final Office Action and the Advisory Action.

**Interview Record**

On November 26, 2003, Applicants' undersigned attorney spoke with Examiner Margaret Medley and confirmed that a response to the Final Office Action of May 22, 2003, was filed, as evidenced by the copy of the date-stamped postcard attached hereto. In view of the prior filing, Examiner Medley indicated that the case would not be held abandoned.

**Affidavit Under 37 C.F.R. § 1.132**

Applicants submit herewith an Affidavit under 37 C.F.R. § 1.132 provided by Robert V. Fox, one of the inventors of the above-referenced application. The Affidavit addresses the concerns raised by the Examiner on p. 5 of the Office Action mailed November 29, 2002. Specifically, paragraphs 3-9 of the Affidavit attest that glycerol is not inherently produced in the reaction of Vieville.

### 35 U.S.C. § 112 Claim Rejections

Claim 30 stands rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants have amended claim 30 to remove the term “controlling” and to enhance the clarity of the claim. As such, Applicants respectfully request that the new matter rejection be withdrawn.

### 35 U.S.C. § 102(b) Anticipation Rejections

#### Anticipation Rejection Based on Vieville *et al.*

Claims 29 and 30 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Vieville *et al.* (“Vieville”). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

Vieville discloses a method of esterifying oleic acid by methanol in supercritical carbon dioxide (“CO<sub>2</sub>”). Vieville at column 2 of p. 2065. P-toluenesulfonic acid (“p-TSA”) and cation-exchange resins were used as catalysts in the esterification reaction. *Id.* To esterify the oleic acid, thus forming methyl oleate, oleic acid, methanol, and the catalyst were placed in a sapphire reactor. *Id.* CO<sub>2</sub> was then flowed into the reactor at a pressure of 50-55 bar. *Id.* at column 1 of p. 2066. The reaction catalyzed by p-TSA was conducted in a homogenous phase while the reaction catalyzed by the cation-exchange resins was performed in a heterogenous phase. *Id.* at column 1 of p. 2066-column 2 of p. 2066. At various times during the reaction, samples were removed from the sapphire reactor through a sampling loop to determine concentrations of the oleic acid and the methyl oleate. *Id.* at column 1 of p. 2066. The concentrations of the oleic acid

and methyl oleate were quantified by high-pressure liquid chromatography ("HPLC"). *Id.* at column 1 of p. 2066.

Vieville does not describe each and every element of claim 29 because Vieville does not disclose the limitation of "reacting the organic composition with the short chain alcohol or water in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig, wherein the reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol and wherein the glycerol leaves the single phase as the glycerol is formed." Specifically, Vieville does not disclose that "the reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol and wherein the glycerol leaves the single phase as the glycerol is formed." Rather, Vieville only discloses that methyl oleate is produced. *Id.* at column 1 of p. 2066.

The Examiner argues "that the glycerol that is inherently produced in the reaction inherently drops out of the reaction of Vieville because the fatty acid, solid catalyst, SC-CO<sub>2</sub> fluid reaction temperatures and pressures is the same as that of the instant claims and therefore inherently produces the same reaction products under the reaction conditions" Office Action of November 29, 2002, p. 5. However, the Examiner has provided no objective support for this assertion.

Contrary to the Examiner's assertions, and as attested to in the accompanying Affidavit, glycerol is not produced in the esterification reaction of Vieville. See accompanying Affidavit, paragraphs 3-9. It is well known in the art that the production of glycerol requires a triglyceride as a starting material. However, nothing in Vieville discloses using a triglyceride as a starting material. Rather, the only starting material in Vieville is oleic acid, which is a fatty acid and is not a triglyceride. As such, Applicants respectfully submit that the Examiner's assertion that the reactants in Vieville are the same as recited in the claims is incorrect. Furthermore, Applicants respectfully submit that the Examiner's assertion that glycerol is inherently produced in the reaction of Vieville is incorrect.

Since Vieville does not disclose producing glycerol, Vieville necessarily does not disclose that "the reaction occurs in a single phase to produce a final product comprising an alkyl ester

and glycerol” or that “the glycerol leaves the single phase as the glycerol is formed,” as recited in claim 29.

Even if it is assumed for the sake of argument that glycerol is produced in Vieville, which is erroneous for the reasons discussed above, Vieville does not disclose that the glycerol leaves the single phase as it is formed, as recited in claim 29. Vieville is silent regarding separating the products formed by its esterification reaction and, therefore, does not disclose that any reaction products leave the single phase as they are formed. The teachings of Vieville relate predominantly to the efficient reaction of oleic acid with methanol to form methyl oleate and to quantifying the concentrations of oleic acid and methyl oleate that are present at various times during the reaction. As such, Vieville does not discuss separating the methyl oleate. The only separation described in Vieville is the separation of the organic phase and the solid catalyst by a filtration process. However, this separation is not performed by modifying the temperature and pressure of the reaction conditions. In addition, the disclosed separation is not analogous to the claimed invention because the separation is performed with conventional media and not critical fluid media.

Furthermore, the apparatus disclosed in Vieville is not configured to allow the product, methyl oleate, to leave the single phase as it is formed. The Examiner has provided no support that this apparatus is configured so that the methyl oleate is capable of leaving the single phase as it is formed. Rather, the apparatus is configured to perform the esterification reaction and conduct subsequent HPLC analysis of the reactants and the products.

Vieville also does not disclose that water reacts with the oleic acid to produce a final product. Rather, the water disclosed in Vieville is used to shift the equilibrium of the esterification reaction when conventional media, not supercritical media, are used. Water is not disclosed as a reactant in the esterification reaction when supercritical CO<sub>2</sub> is used.

Since Vieville does not describe each and every element of the claim, claim 29 is allowable and Applicants respectfully request that the rejection be withdrawn.

Vieville also does not describe each and every element of claim 30 because Vieville does not disclose “reacting the organic composition with the C<sub>1</sub>-C<sub>4</sub> short chain alcohol or water in the presence of a catalyst in the single phase to produce a final product stream comprising an alkyl

ester and glycerol.” As discussed above with respect to the anticipation rejection of claim 29, Vieville does not disclose that glycerol is formed. Furthermore, the glycerol is not inherently produced for substantially the same reasons discussed above in the anticipation rejection of claim 29. In addition, Vieville does not disclose that water reacts with the oleic acid to produce a final product, as discussed above. Rather, the water disclosed in Vieville is used to shift the equilibrium of the esterification reaction when conventional media, not critical fluid media, are used. Water is not disclosed as a reactant in the esterification reaction when supercritical CO<sub>2</sub> is used.

Vieville also does not disclose “separating the glycerol from the final product stream by modifying at least one of the temperature and pressure of the critical fluid medium” and “separating the alkyl ester from the critical fluid medium by modifying at least one of the temperature and pressure of the critical fluid medium,” as recited in claim 30. As discussed above with respect to the anticipation rejection of claim 29, glycerol is not produced in the esterification reaction of Vieville. Therefore, Vieville necessarily does not disclose that the glycerol is separated by modifying the temperature or pressure of the critical fluid medium. Vieville also does not disclose that the alkyl ester is separated from the critical fluid medium by modifying at least one of the temperature and pressure of the critical fluid medium. Rather, Vieville is silent regarding the separation of the products of its esterification reaction. The only separation disclosed in Vieville is the separation of the organic phase and the solid catalyst by a filtration process. However, this separation does not separate the methyl oleate and is not performed by modifying the temperature and pressure of the critical fluid medium. Furthermore, the disclosed separation is not analogous to the claimed invention because the separation is performed with conventional media, and not critical fluid media.

Since Vieville does not describe each and every element of the claim, claim 30 is allowable and Applicants respectfully request that the rejection be withdrawn.

### 35 U.S.C. § 103(a) Obviousness Rejections

#### Obviousness Rejection Based on Vieville and further in view of McDaniel *et al.*

Claims 16-23, 25, 27, and 28 stand rejected under 35 U.S.C. § 103(a) ("Section 103") as being unpatentable over Vieville as applied to claims 29 and 30 above, and further in view of McDaniel *et al.* ("McDaniel"). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103 rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The obviousness rejections of claims 16-23, 25, 27, and 28 are improper because the cited references, in combination, do not teach or suggest all the claim limitations and do not provide a motivation to combine to produce the claimed invention.

The teachings of Vieville are as previously summarized.

McDaniel discloses esterification of decanoic acid during supercritical fluid extraction. McDaniel at p. 201. In McDaniel, experiments were conducted to determine whether methylation of decanoic acid occurred mainly during the collection step or during the supercritical fluid extraction. *Id.* at column 1, p. 202 and column 2, p. 203. Methylation was found to occur mainly during the collection step. *Id.* The effect of collection temperature on the methylation of decanoic acid was also investigated. *Id.* at column 2, p. 206, column 1, p. 207.

The Examiner states that claims 16-23, 25, 27, and 28 are rejected under Section 103 for the reasons made of record in the Office Action of November 29, 2002. Office Action of May 22, 2003, p. 4. However, in the Office Action of November 29, 2002, only claims 18, 19,



24, 25, and 28 were rejected under Section 103. Therefore, claims 16, 17, 20-23, and 27 were not previously rejected under this section and no reasons of record regarding these claims exist.

Vieville and McDaniel do not teach or suggest all the limitations of claim 16 because they do not teach or suggest "reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein the glycerol leaves the single phase as it is formed." Vieville does not teach or suggest this limitation for substantially the same reasons discussed above with respect to the anticipation rejection of claims 29 and 30. Specifically, Vieville does not teach or suggest that glycerol is produced, that glycerol leaves the single phase as it is formed, or that water reacts with the oleic acid to produce a final product. McDaniel does not cure these deficiencies in Vieville. In addition, McDaniel does not teach or suggest this limitation because McDaniel does not teach or suggest that the esterification reaction is performed in a single phase. Rather, McDaniel uses a fluid extraction technique with supercritical fluids to separate components of a mixture.

The Examiner states that McDaniel provides the motivation to combine the esterification of the fatty acid, as disclosed in Vieville, with the use of a liquid HCl catalyst, as disclosed in McDaniel, because McDaniel teaches the same process of Vieville. Office Action of November 29, 2002, p. 7. However, the fact that McDaniel allegedly teaches the same process as Vieville is not an objective reason that supports combining the cited references. Rather, this reasoning provided by the Examiner is conclusory and does not satisfy the Examiner's burden to establish a motivation to combine.

Since the cited references do not teach or suggest all the limitations of claim 16 and do not provide a motivation to combine, Applicants submit that the rejection is improper and should be withdrawn.

Claims 17-23, 25, and 27 depend from independent claim 16 and, as such, include all the limitations of claim 16. These claims are allowable, *inter alia*, as depending from an allowable base claim.

Claims 18 and 19 are further allowable because there is no motivation to combine the liquid catalyst of the supercritical fluid extraction of McDaniel with the teachings of Vieville to

produce the claimed invention. As acknowledged by the Examiner, Vieville does not teach or suggest a liquid catalyst. Office Action of November 29, 2002, p. 6. Therefore, the Examiner relies on McDaniel as teaching a liquid catalyst in the esterification reaction. The Examiner states that McDaniel provides the motivation to combine the esterification of the fatty acid, as disclosed in Vieville, with the use of a liquid HCl catalyst, as disclosed in McDaniel, because McDaniel teaches the same process of Vieville. Office Action of November 29, 2002, p. 7. However, the fact that McDaniel allegedly teaches the same process as Vieville is not an objective reason that supports combining the cited references. Rather, this reasoning provided by the Examiner is conclusory and does not satisfy the Examiner's burden to establish a motivation to combine. In addition, the portion of McDaniel cited by the Examiner discloses supercritical fluid chromatography to separate products of an esterification reaction and, as such, uses a mobile phase to elute the desired products. This supercritical fluid chromatography technique is not similar to the esterification reaction of Vieville and, therefore, the reasoning provided by the Examiner does not provide the necessary motivation to combine to produce the claimed invention.

Claim 25 is further allowable because neither of the cited references teaches or suggests recycling the critical fluid medium.

Claim 27 is further allowable because neither of the cited references teaches or suggests including a critical fluid co-solvent selected from the group consisting of methanol, ethanol, butanol, and water.

The cited references also do not teach or suggest all the limitations of claim 28. Specifically, the cited references do not teach or suggest "reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein the glycerol leaves the single phase as it is formed," for substantially the same reasons discussed above with respect to the Section 103 rejection of claim 16.

The cited references also do not teach or suggest "separating the glycerol from the final product by modifying the temperature and pressure of the final product" and "separating the alkyl ester product from the critical fluid medium by modifying the temperature and pressure of the



critical fluid medium,” as recited in claim 28. The Examiner states that McDaniel discloses controlling the temperature of the reaction to separate the alkyl ester from the critical fluid medium. Office Action of May 22, 2003, p. 6. However, the portion of McDaniel cited by the Examiner actually discusses the effect of collection temperature on conversion of decanoic acid to the methyl ester. In other words, this portion of McDaniel investigates the effect of temperature on the esterification reaction. Contrary to the Examiner’s assertions, this portion of McDaniel does not teach or suggest that the temperature and pressure are modified to separate the components of the esterification reaction. Rather, as later noted by the Examiner, McDaniel discloses that extraction is used to separate the methyl ester from the critical fluid medium. Office Action of November 29, 2002, p. 7. Therefore, McDaniel does not teach or suggest that the temperature or pressure is modified to separate the glycerol from the final product or to separate the alkyl ester from the critical fluid medium.

In addition, no motivation to combine the cited references exists for substantially the same reasons previously discussed in the rejection of claims 16-23, 25, and 27.

Since the cited references do not teach or suggest all the claim limitations of claim 28 or provide a motivation to combine, Applicants respectfully request that the rejection be withdrawn.

### ENTRY AND PURPOSE OF AMENDMENTS

The proposed amendments to claims 16, 17, 19, 25, 27, and 28-30 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Applicants respectfully assert that no surrender or disclaimer of claim scope and, more specifically, of the broadest possible range of equivalents to which Applicants may be entitled has been effectuated.

Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

### CONCLUSION

Claims 16-23, 25, and 27-30 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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